

1. Consider the transformation $y(x) = A \cdot \cos(Bx + C) + D$ where A, B, C , and D are positive constants. How does the value of each constant affect the graph of the standard cosine function. Be specific.

A: The amplitude of the function is $|A|$. The value of A affects the vertical stretch of the graph. One half of $|A|$ is the difference between the maximum and minimum values.

B: The value of B affects the length of the period of the function. $\text{Period} = \frac{2\pi}{B}$

C: The value of C affects the horizontal shift of the graph of the function. The horizontal (or phase) shift is $\frac{C}{B}$

D: The value of D affects the vertical translation or shift of the graph. The value of D is the average value of the function over $(-\infty, \infty)$

2. The following function describes the air temperature in Fairbanks, Alaska as a function of time. Without graphing the function, determine the period, amplitude, and average value. Include a practical interpretation.

$$T(t) = 37 \sin\left(\frac{2\pi}{365} \cdot t - 1.7386\right) + 25$$

$$A = 37 \quad B = \frac{2\pi}{365}$$

$$C = -1.7386 \quad D = 25$$

period:

$$\begin{aligned} \text{period} &= \frac{2\pi}{B} \\ &= \frac{2\pi}{\frac{2\pi}{365}} = 365 \end{aligned}$$

amplitude:

$$\text{amplitude} = |A| = 37$$

average value:

$$\text{average value} = D = 25$$